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(71) Applicant(s) Rabinder Singh Mandair Pine Tree Cottage, Oak Tree, Reigate, Surrey, RH2 7ES, United Kingdom	(56) Documents Cited GB 2261976 A GB 2254509 A GB 2244580 A EP 0717290 A2 EP 0568427 A1 WO 96/14591 A1 WO 94/04975 A1 WO 93/24894 A1 US 5467072 A
(72) Inventor(s) Rabinder Singh Mandair	(58) Field of Search UK CL (Edition O ) H4D DLAA DLAB DLRA DLRC DLRE DLRG DLRJ DLRP DLRU DLRX DRPB DRPC INT CL <sup>6</sup> G01S , G08G
(74) Agent and/or Address for Service Rabinder Singh Mandair Pine Tree Cottage, Oak Tree, Reigate, Surrey, RH2 7ES, United Kingdom	

(54) Abstract Title  
**Vehicular distance monitoring and warning device**

(57) A vehicular distance monitoring and warning device which has five main components:

- an array of laser transmitters/receivers at the front 10 and rear 12 of the Vehicle, to measure distances to objects/vehicles in the Vehicle's path and in its wake;
- automatic sensors of humidity 18 and temperature 22 fitted outside the Vehicle, to provide an indication of the quality of driving conditions;
- a digital feed from the speedometer of the Vehicle;
- a microprocessor which, every few milli-seconds, takes the above inputs and contains a software programme to calculate quality of driving conditions and safe distances for the speed of the Vehicle, comparing the safe distances to actual distances, and communicating the results to the indicators 14 and 15;
- indicators in the Vehicle 15 and at the rear of the Vehicle 14, warn when actual distances are not safe. The vehicle may also detect objects to its side. The results may be recorded to facilitate accident analysis. Radio transmitters may transmit information about weather, safe speeds etc.

FIG 3

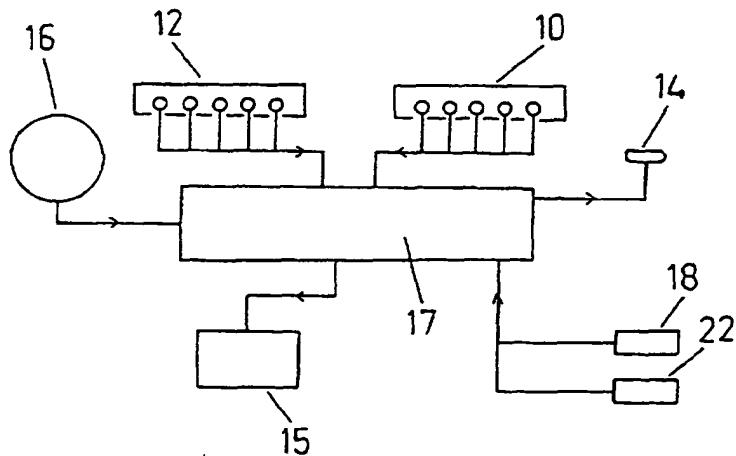


FIG. 1

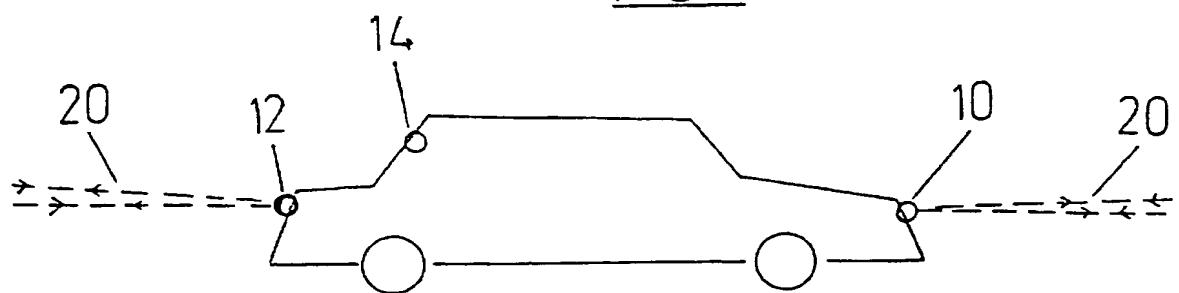


FIG. 2

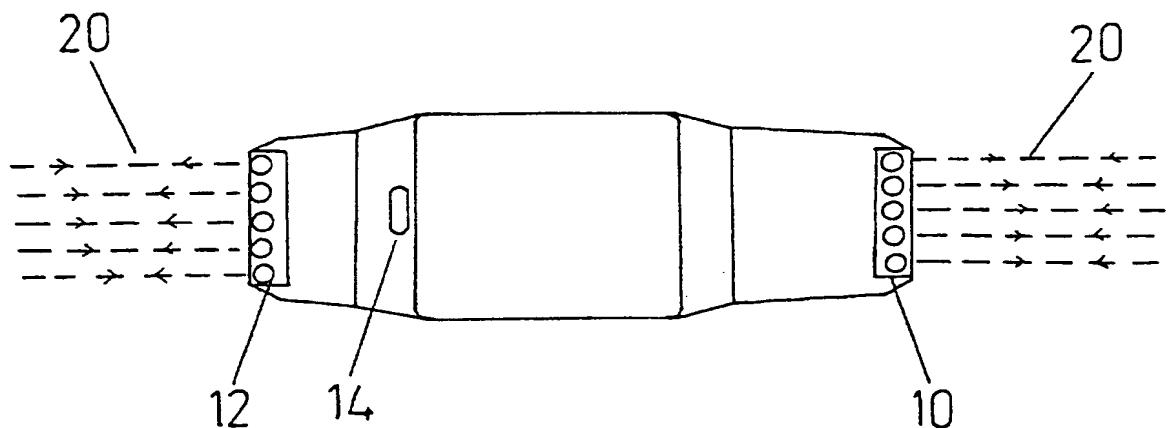
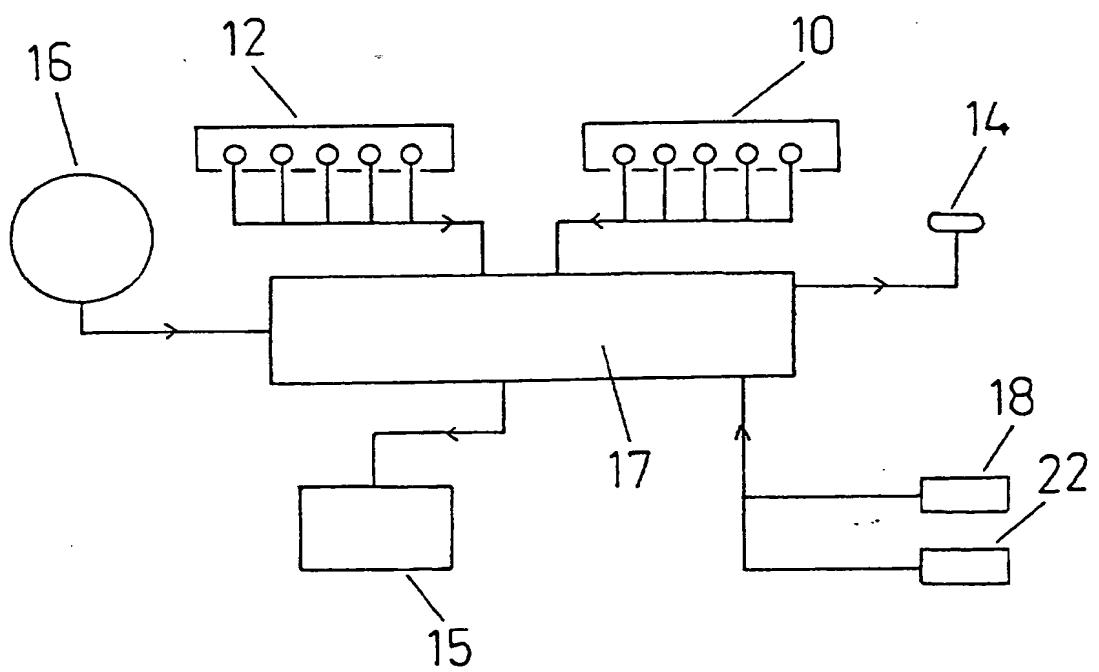


FIG. 3



VEHICULAR DISTANCE MONITORING AND WARNING DEVICE

This invention relates to a vehicular distance monitoring and warning device.

One of the most common complaints from motorists, and a common cause of accidents, is the failure to maintain an adequate distance between moving vehicles, particularly on motorways.

There is currently no device available which automatically provides a warning to the driver of a vehicle and to other drivers when a safe distance is not being maintained between vehicles.

According to the present invention, there is provided in a vehicle, a distance monitoring and warning device, which automatically measures the distances from stationary or moving objects in the vehicle's path and in its wake; the device automatically compares such distances to the speed of the vehicle and, taking into account the prevailing weather conditions, provides a visible and aural indication as to whether or not a safe distance persists between the vehicle and the objects. This indication is communicated visually to other road users and aurally within the vehicle, offering a warning where a safe distance does not persist.

The device could also be used to monitor safe distances from objects to either side of the vehicle.

A recording machine could be added to the device to provide a recent history of a vehicle's movements relative to other objects, stationary or moving; if the vehicle were involved in an accident, such a device may then help to provide evidence as to the cause of the accident.

As nation-wide traffic and road safety systems progress, for example through local radio, through electronic warning signs on motorways and through in-car traffic systems, such traffic and road safety systems could send signals to the device to indicate local weather conditions, safe speed and travelling distances; the device would then use such information in its calculations of, and indication of, whether or not safe distances persist from other vehicles and objects for those local road and weather conditions.

The technologies employed in the component parts of the device are known; it is the amalgamation of these components into a single device which is the embodiment of this invention.

A specific embodiment of the invention will now be described by way of an example which employs laser technology to measure distances, with reference to accompanying drawings:

**Figure 1:** shows the side elevation of a Vehicle with laser beams 20 indicated by dotted lines.

**Figure 2:** shows the plan elevation of this Vehicle with laser beams 20 again indicated by dotted lines.

**Figure 3:** is a block diagram showing the various components of the distance monitoring and warning system.

Referring to these drawings:

Generally, the device will consist of a microprocessor 17 which will take input data from various instruments (10, 12, 16, 18, 22), process this data and output the result within the car for the driver to see or hear 15 and for other drivers to see 14. Such microprocessors are commonly available with input/output ports which can receive/deliver digital signals; microprocessors are also available which can take analogue signals as inputs and convert them into digital form.

The software programme which will process the data may be written in source code or a higher level programming language such as assembler language and may be a relatively straightforward programme which, for example, uses look-up tables: the Highway Code and a number of motoring organisations and vehicle manufacturers produce tables and information, regarding safe breaking distances at various speeds and for various driving conditions and vehicles, which may be used to calculate safe driving distances. For a relatively straightforward programme, measured data would be compared against the data in the tables and the results output to the warning devices 14 and 15.

An array of laser points is fitted at the front of the Vehicle 10 and at the rear of the Vehicle 12. Each laser point comprises a laser transmitter and receiver. The lasers are used to measure the distances from objects to the front and rear of the Vehicle. The technology employed in this component of the device is known, probably the best known example being the "Speed gun" used by police to measure speeds at which vehicles are travelling.

The laser points should be fitted at a certain distance from each other to accommodate the following three criteria:

- (i) Laser beams should be able to detect narrow objects such as cyclists.
- (ii) Laser beams will typically spread to a 1.65 metre spot over a distance of 600 metres. Laser points on the outer sides of the arrays should therefore be adjusted so that they do not detect objects/vehicles to one side of the Vehicle, for example, cars travelling in the next lane on a motorway. This may be achieved in a number of ways including using appropriate intensity laser transmitters or directing the laser beam inwards.
- (iii) Each alternate laser point's vertical direction should be off-set from the horizontal plane so that the laser beams may detect higher and lower vehicles, taking into account the spread mentioned at point (ii).

At the rear of the Vehicle, probably at the top of the rear windscreen, is an indicator 14 which lights up when the vehicle behind encroaches within a safe distance of the Vehicle (for the speed and road conditions).

Within the Vehicle, probably on the dashboard, is an indicator 15, a light, aural tone signal or numeric indicator (or some combination of these). Where the Vehicle is too close to the vehicle/object in front (for the speed and road conditions) this indicator 15 provides a warning to the driver of the Vehicle and may also give, for instance, the actual number of metres between the Vehicle and the object/vehicle, above or below the safe distance.

There is a feed from the speedometer 16 (possibly via an analogue to digital converter if the speedometer is not digital) to the microprocessor 17.

External sensors are fitted to the outside of the Vehicle and provide automatic relevant input into the microprocessor of the factors which dictate the quality of driving conditions: humidity and temperature. The sensors accordingly are a digital humidity measuring device 18 and a digital thermometer 22 which will be fitted around the Vehicle. Both digital thermometers and humidity measuring devices are available which would have the necessary tolerances to be capable of deployment around a vehicle.

The microprocessor 17 contains software programmes which, every few milliseconds:

- a) take feeds from the external sensors 18 and 22, to calculate the type of driving conditions, perhaps categorised as good, fair, poor and very poor;
- b) take the relevant feeds concerning speed, distance from objects/other vehicles and the type of driving conditions (humidity and temperature) and, for these inputs, calculates a safe distance from the vehicle/object in front and behind; the safe distance is compared with the actual distance and the results communicated to the indicators 14 and 15 as necessary.

## CLAIMS

- 1 A distance monitoring and warning device, in a vehicle, which measures the distances from stationary or moving objects in the vehicle's path and in its wake; the device compares such distances to the speed of the vehicle and takes into account the prevailing weather conditions to provide a visual and aural indication as to whether or not a safe distance persists between the vehicle and the objects.
- 2 A distance monitoring device as claimed in Claim 1, wherein, the device may also measure distances from objects to each side of it, providing an indication as to whether or not a safe distance persists between the vehicle and objects to either side.
- 3 A distance monitoring device as claimed in Claim 1 or Claim 2, wherein a recording machine is added to the device to provide a history of a vehicle's movements relative to other objects, stationary or moving.
- 4 A distance monitoring device as claimed in Claim 1 or Claim 2, wherein electromagnetic signals (such as radio waves) are received by the device, transmitted by sources such as local radio stations, motorway traffic systems or "in-car" traffic systems, which indicate local weather conditions, safe speeds and travelling distances.



Application No: GB 9718435.2  
Claims searched: all

Examiner: Dr E P Plummer  
Date of search: 10 November 1997

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): H4D (DRPC, DRPB, DLAB, DLRA, DLRC, DLRE, DLRG, DLRJ, DLRP, DLRU, DLRX, DLAA)

Int Cl (Ed.6): G01S, G08G

Other:

**Documents considered to be relevant:**

Category	Identity of document and relevant passage		Relevant to claims
Y	GB2261976A	Bennett whole document, eg abstract	1
Y	GB2254509A	Clark whole document, eg abstract	1,2
Y	GB2244580A	Langdon whole document, eg abstract	2
Y	EP0717290A2	Honda whole document, eg abstract, figure 1	1,2
Y	EP0568427A1	Thomson-CSF whole document, eg figure 4	1,2
X	WO96/14591A1	Rashid	1,2
Y		whole document, eg abstract, figures 1 & 2	3
Y	WO94/04975A1	Vorad whole document, eg abstract	3

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.

& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.



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Application No: GB 9718435.2  
Claims searched: all

Examiner: Dr E P Plummer  
Date of search: 10 November 1997

Category	Identity of document and relevant passage		Relevant to claims
X	WO93/24894A1	Davidian & Mor	
Y		whole document, eg abstract, figures 1, 2 & 4, pages 9 to 11 "automatic sensors" section	1,2 3
Y	US5467072	Piccard Enterprises whole document, eg end of abstract	1,2

X

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art.
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